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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,165	09/18/2003	J. Young J. Paik	007734 FPS/MMCS/APC/DV	6290

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Patent Counsel, MS/2061
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EXAMINER
MACARTHUR, SYLVIA

ART UNIT	PAPER NUMBER
1792	

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01/24/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/665,165	PAIK, J. YOUNG J.	
	Examiner	Art Unit	
	Sylvia R. MacArthur	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) *10-30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/18/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/18/2007 has been entered.

Information Disclosure Statement

2. The information disclosure statement filed 6/18/2007 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered. The foreign reference referred to on pages 3 out of 4 ,4 out of 4, 1 of 26, and 12-26 of 26 have not been considered.

3. The information disclosure statement filed 6/18/2007 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because applicant has listed the serial numbers of several US applications but has not submitted the relevant claims or office action where applicable. It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with

the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

Election/Restrictions

4. Applicant's election without traverse of claims 1-9 in the reply filed on 10/18/2007 is acknowledged.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-4 and 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jensen et al (US 6,315,634) in view of Campbell et al (US 6,350,179, referred to as Campbell '179) and Campbell et al (US 6,230,069, referred to as Campbell et al '069) .

Jensen et al teaches a method of optimizing a CMP process, see Fig. 5 and col.2 lines 55-64 –col. 4 lines 61. Therein Jensen teaches a wafer with a plurality of dielectric layers (col. 2: lines 57- 64). The model comprises at least one control parameter, removal rate, uniformity of polishing, and presence of defects (col. 5 :1-27). Jensen et al teaches steps a-c of claim 1, but fails to teach steps d and e.

The prior art of Campbell et al '179 teaches a method of determining a polishing recipe based upon the measured prepolish thickness of a process layer. See the figures of Campbell et al and col. 6 : lines 38-58. Fig. 4 of Campbell et al '179 teaches step d)

wherein a comparison takes place between the previously stored or initial process parameter and the actual measured value. The motivation to modify the method of Jensen et al to include step d) is that the comparison of predicted vs. actual values allows for a better measurement of determination of the process state by providing such quantitative analysis. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide step d) in the method of Jensen et al.

The combination of Jensen et al and Campbell '179 fail to teach step e) of the present invention.

Campbell et al '069 teaches a system and method for controlling the manufacture of discrete parts in semiconductor fabrication using model predictive control. Figure 3 teaches step e and col.2:lines 55-67 wherein the polishing recipe is used for subsequent wafer runs. The motivation to further modify the method of Jensen et al and Campbell '179 with step e) as taught by Campbell is for more predictive control of the CMP process and thus more optimization of the CMP process. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to use the teachings of Campbell et al '069 and Campbell et al '179 to modify the method of Jensen et al to produce a feed forward CMP process monitoring system for a wafer with a plurality of dielectric layers.

Regarding claims 2, 3, and 6: Fig. 5 of Jensen et al recites that the first and second polishing recipe are for the same wafer, see also the paragraph joining cols. 4 and 5.

Since the polishing recipes are for the same wafer it is inherent that the total/overall polishing result is recited as the sum total of each process recipe.

Regarding claim 4: Jensen et al fail to teach the film thickness and or polishing time as the characteristic control parameters.

Campbell et al '179 teaches the use of a metrology tool to determine the film thickness see col. 4: lines 41-67. The film thickness is a conventionally measured value that is used to ascertain the status of the polishing process. The motivation to perform thickness measurements is that they are conventionally known and widely accepted quantitative analysis measures of the semiconductor manufacturing process. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to use the teachings of Campbell et al '069 and Campbell et al '179 to modify the method of Jensen et al to produce a feed forward CMP process monitoring system for a wafer with a plurality of dielectric layers wherein film thickness is the basis of quantitative analysis.

Regarding claim 7: Col. 5 lines 20-28 and col. 6 lines 1-14 .of Jensen et al teaches that the tool state of the polishing pad can be ascertained from the taught method

Regarding claim 8: Jensen et al fails to teach the use of the recordable medium. Campbell et al '179 teaches inputting data, receiving data, and recording said data in

Figs. 3-5 and the use of computer in the paragraph joining cols. 4 and 5. The recordable mediums are disclosed in the paragraph joining columns 6 and 7. The motivation to modify the method of Jensen et al to use the master controller in the form of a computer with recordable mediums or program storage devices is that this allows for reliable, easily accessible data entry and storage in an automated process control environment. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to use the teachings of Campbell et al '069 and Campbell et al '179 to modify the method of Jensen et al to use the computer and data storage devices as taught by Campbell et al '179.

Regarding claim 9: Jensen et al fails to teach the step of fitting a curve to establish the relationship between the wafer characteristic and the control parameter. See cols. 5 and 6 of Campbell et al '069 teaches this relationship see the formulas. The motivation to modify the teachings of Jensen et al to include the step of fitting a curve as taught b Campbell et al '069 is that this provide a specific set of equations and instructions has to how one would relate the date from the monitoring device to the processing parameter and thus Campbell et al '069 provides a practical application of the data.

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jensen et al (US 6,315,634) in view of Campbell et al (US 6,350,179, referred to as Campbell '179) and Campbell et al (US 6,230,069, referred to as Campbell et al '069) as applied in claims 1-4 and 6-9 above, and in further view of Shanmugasundram et al (US 2002/0192966).

The teachings of Jensen et al and both Campbell et al '179 and Campbell et al '069 were discussed above. The combined teachings fail to teach defining a plurality of regions on a wafer.

Shanmugasundram et al teaches in situ sensor based control of semiconductor processing procedure wherein a plurality of regions of a wafer are monitored see the figures of Shanmugasundram et al and page 3 . The motivation to modify the combined teachings of Jensen et al and Campbell et al '179 and Campbell et al '069 is that this step considers the topographical differences of the wafer in the radial direction and will thus produce a more accurate process result. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the combined teachings of Jensen et al and Campbell et al '179 and Campbell et al '069 is that this step considers the topographical differences of the wafer in the radial direction .

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-Th during the hours of 8 a.m. and 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sylvia R MacArthur
Primary Examiner
Art Unit 1792

January 21, 2008